

THAT WHICH IS CLAIMED IS:

1. A multi-dose drug containment system package adapted for use in an inhaler, comprising:
 - a support member comprising a plurality of spaced apart drug compartments,
 - 5 each drug compartment having a sealant material detachably sealed thereto; and
 - a plurality of spaced apart tab members, a respective tab member attached to a portion of sealant material that extends over one or more drug compartments, wherein a respective tab member is operatively associated with at least one drug compartment so that, in operation, the respective tab member is configured to be grasped, such
 - 10 grasping causing the associated sealant material to pull away from at least one drug compartment to release a drug held therein.
2. A drug containment system according to Claim 1, further comprising a meted dose of dry powder disposed in each drug compartment.
- 15 3. A drug containment system according to Claim 1, wherein the tab members comprise loop members disposed proximate an outermost edge portion of the support member.
- 20 4. A drug containment system according to Claim 3, wherein the support member is generally shaped as a card and/or disc and has a generally rigid elastomeric body.
- 25 5. A drug containment system according to Claim 1, wherein the tab member has increased structural rigidity relative to the sealant material.
6. A drug containment system according to Claim 3, wherein the loop member is configured with a closed perimeter about an aperture.
- 30 7. A drug containment system according to Claim 1, wherein the tab member comprises an elastomeric material.

8. A drug containment system according to Claim 3, wherein the loop members extend generally downwardly in position in an inhaler.

5 9. A drug containment system according to Claim 7, wherein the sealant material comprises foil, and wherein the tab member has increased structural rigidity relative to the sealant material and less structural rigidity than the support member.

10 10. A drug containment system according to Claim 1, wherein a respective tab member is operatively associated with a plurality of drug compartments.

11. A drug containment system according to Claim 10, wherein each tab member is operatively associated with a first and second drug compartment, each drug compartment holding a different metered drug.

15 12. A drug containment system according to Claim 1, wherein the support member is a unitary generally rigid elastomeric body with opposing upper and lower primary surfaces and a plurality of cavities formed therein, the cavities being open at the lower primary surface and defining the drug compartments.

20 13. A drug containment system according to Claim 12, wherein the upper primary surface of the support member defines a closed generally planar ceiling over all of the cavities.

25 14. A drug containment system according to Claim 13, wherein the sealant material of each drug compartment is attached to the lower primary surface of the support member, and wherein the tab members are disposed at an outermost edge portion of the lower primary surface of the support member and extend away from the lower primary surface thereof in a generally downward direction in position in an inhaler.

30 15. A drug containment system according to Claim 14, wherein the sealant material is a unitary layer that extends across the lower primary surface of the support

member and includes preferentially weakened release regions in communication with each tab member, the regions spanning selected neighboring pairs of drug compartments.

5 16. A drug containment system according to Claim 14, wherein the sealant material is configured as a plurality of sealant material strips, one of each of which is associated with a respective tab member.

10 17. A drug containment system according to Claim 16, wherein each strip extends across a plurality of neighboring spaced apart drug compartments and, in operation, is configured to expose the neighboring plurality of drug compartments for generally concurrent release.

15 18. A drug containment system according to Claim 1, wherein each tab member is operatively associated with at least two neighboring drug compartments, and wherein the neighboring drug compartments each hold a metered amount of a different dry powder drug to thereby allow combination inhalation dry powder drug delivery in operative position in an inhaler.

20 19. A drug containment system according to Claim 1, wherein the plurality of drug compartments is at least 60.

25 20. A drug containment system according to Claim 19, wherein the plurality of drug compartments is between about 90 to about 120.

 21. A drug containment system according to Claim 3, wherein the loop members extend generally horizontally in operative position in an inhaler.

30 22. A drug containment system according to Claim 19, wherein the support member has a generally circular profile, and wherein the plurality of drug compartments comprise a first plurality of circumferentially spaced apart drug compartments disposed about a substantially common first radius extending from a

center of the support member and a second plurality of circumferentially spaced apart drug compartments disposed about a second substantially common longer radius extending from the center.

5 23. A drug containment system according to Claim 22, wherein each tab member is operatively associated with one drug compartment disposed in the first radius location and one second drug compartment disposed in the second radius location.

10 24. A drug containment system according to Claim 19, wherein the support member has a width and length that is about 4.5 inches or less.

 25. A drug containment system according to Claim 12, wherein the support member drug compartment cavities have a thickness that is less than about 0.25
15 inches, and wherein the drug containment system is disposable after the drug or drugs therein have been dispensed in an inhaler.

 26. A dry powder inhaler comprising:
 an elongate chamber having opposing first and second end portions, a floor,
20 and a ceiling with dry powder entry window, the first end portion merging into an inhaler mouth port and the second end portion merging into an air inlet port such that the mouth and air inlet ports are in fluid communication;
 a vibrator operatively associated with a portion of the elongate chamber; and
 a multi-dose dry powder package comprising a plurality of spaced apart
25 discrete metered amounts of particulate dry powder in respective sealed drug compartments, wherein, in operation, at least one of the compartments is configured to align with the chamber entry window to release at least one metered amount of dry powder therein.

30 27. A dry powder inhaler according to Claim 26, wherein the vibrator is configured to contact the elongate chamber floor, and wherein the inhaler port and the

air inlet port are generally axially aligned about opposing end portions of the inhaler and configured to be oriented about a generally horizontal plane during inhalation.

28. A dry powder inhaler according to Claim 26, wherein the dry powder
5 inhaler has a length from a forward edge portion to a rearward edge portion thereof when held in an operative position, and wherein the elongate chamber has a length that extends across at least a major portion of the length of the inhaler.

29. A dry powder inhaler according to Claim 26, wherein the elongate
10 chamber has generally the same cross-sectional area for greater than a major portion of the length of the inhaler.

30. A dry powder inhaler according to Claim 28, wherein the elongate
15 chamber is generally tubular along at least a major portion of its length.

31. A dry powder inhaler according to claim 28, wherein the elongate chamber
runs substantially the entire length of the inhaler with the air inlet port located on an
outermost edge portion of the inhaler and the mouth port located on a diametrically
opposed outermost edge portion of the inhaler.

32. A dry powder inhaler according to Claim 26, wherein the chamber window
20 is disposed closer to the air inlet port than the mouth port.

33. A dry powder inhaler according to Claim 26, wherein the dry powder
25 package is generally configured as a disk, wherein each drug compartment comprises a releaseable floor, and wherein, in operation, the dry powder package is configured to cooperate with the inhaler to rotate and orient at least one drug compartment to overlie the elongate channel window for active dispensing.

34. A dry powder inhaler according to Claim 33, wherein the dry powder
30 package has a generally structurally rigid unitary primary body with cavities defining a ceiling and sidewalls of respective drug compartments, and wherein the floors

comprise a flexible material and are configured to extend across the respective cavities to define a generally planar sealant layer.

35. A dry powder inhaler according to Claim 26, further comprising a display
5 configured to display the number of doses available in the inhaler.

36. A dry powder inhaler according to Claim 35, wherein the dry powder
package is disposable after the metered amounts of dry powder are used, the inhaler
further comprising a controller in communication with the display, the controller
10 configured to communicate with the disposable multi-dose dry powder package held
therein, and wherein the controller is configured to automatically determine the
number of doses available for dispensing on the disposable dry powder package and
automatically count down and display the number available.

37. A dry powder inhaler according to Claim 26, wherein the drug
15 compartments comprise a detachable sealant material, the inhaler further comprising a
translating hook member held in the inhaler, wherein, in operation, the hook member
is operatively associated with one or more drug compartments as the dry powder
package rotates the drug compartments into an active dispensing position in the
20 inhaler, the hook member configured to engage and peel the sealant material off the
one or more drug compartments held in the active dispensing location and release the
dry powder held therein into the window of the elongate channel.

38. A dry powder inhaler according to Claim 37, wherein, in operative
25 position, the hook member is held generally horizontally below at least one dry
powder package compartment proximate the elongate channel window.

39. A dry powder package according to Claim 38, wherein the hook member
is configured with an elongate primary portion that merges into a curvilinear
30 secondary portion that is disposed above the primary portion, the secondary portion
having a forward edge portion thereof that faces the direction of the mouth port.

40. A dry powder inhaler according to Claim 37, wherein, in operation, the hook member translates in the inhaler toward the mouth port to pull the detachable sealant material off one or more target drug powder compartments.

5 41. A dry powder inhaler according to Claim 37, wherein, after removal from a respective drug compartment by the hook member, the sealant material remains attached to the dry powder package such that the respective at least one drug compartment has a lowermost portion that is open to allow the dry powder to fall through the window unimpeded by the sealant material.

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42. A dry powder inhaler according to Claim 37, wherein the hook member curvilinear portion is disposed closer to the air inlet port than the mouth port.

15 43. A dry powder inhaler according to Claim 26, wherein each drug compartment comprises a floor comprising a detachable sealant material, and wherein the dry powder package further comprises a plurality of generally downwardly extending tab members attached to selected portions of the floor sealant material proximate one or more drug compartments.

20 44. A dry powder inhaler according to Claim 43, wherein the tab members are circumferentially spaced apart and attached about an outermost edge portion of the dry powder package.

25 45. A dry powder inhaler according to Claim 43, wherein the tab members are configured as loop members.

46. A dry powder inhaler according to Claim 43, wherein the tab members are configured with a closed loop perimeter surrounding an aperture.

30 47. A dry powder inhaler according to Claim 26, further comprising a moveable mouthpiece cover that is rotatable to expose the mouth port and the air inlet port.

48. A dry powder inhaler according to Claim 47, wherein the mouthpiece cover is pivotally attached to the inhaler and is configured to rotate to concurrently expose both the mouth port and the air inlet port during operative use, then rotate to
5 concurrently cover both the mouth port and the air inlet port during non-use.

49. A dry powder inhaler according to Claim 26, wherein the vibrator comprises a piezoelectric member.

10 50. A dry powder inhaler according to Claim 49, wherein the elongate chamber comprises a piezoelectric polymer film in communication with a floor portion thereof, the piezoelectric polymer film being generally aligned across from the channel dry powder entry window, the piezoelectric polymer film defining a portion of the vibrator.

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51. A multi-dose dry powder inhaler, comprising:

an inhaler having a housing body with a mouthpiece port and a spaced apart air inlet port disposed upstream thereof;

20 a multi-dose dry powder package held in the inhaler, the package comprising a plurality of spaced apart drug compartments with a metered amount of dry powder drug held therein, each compartment operatively associated with a tab member, held in the inhaler; and

25 a hook member disposed in the inhaler to translate between forward and rearward positions to engage a target tab member and pull thereon, thereby selectively pulling the associated floor sealant material off of at least one drug compartment during operation.

52. An inhaler according to Claim 51, wherein the dry powder package comprises:

30 a unitary dry powder package body comprising opposing top and bottom primary surfaces with a plurality of spaced apart wells having a depth formed therein, a respective well defining at least a portion of a respective drug compartment; and

a detachable floor sealant material extending across each drug compartment and sealably attached to the bottom primary surface of the dry powder package body to capture the dry powder in a respective drug compartment, wherein the tabs are configured as generally downwardly extending spaced apart tabs attached to an
5 outermost edge portion of a portion of the floor sealant material proximate at least one drug compartment.

53. An inhaler according to Claim 51, further comprising an elongate inhalation drug flow path chamber and a vibrator disposed in the inhaler housing body
10 in communication with the inhalation drug flow path chamber.

54. An inhaler according to Claim 52, wherein the unitary body is a generally rigid elastomeric material and is configured with a generally closed upper surface that defines a ceiling and at least a portion of a sidewall of a respective drug compartment.
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55. An inhaler according to Claim 51, wherein each tab member is operatively associated with a neighboring first and second drug compartment, and wherein the neighboring first and second drug compartments comprise a different metered drug.

20 56. An inhaler according to Claim 52, wherein the drug compartments are configured as pairs of drug compartments, each pair of drug compartments holding a different metered dry powder drug therein, a common sealant material segment defining the floor of each pair of compartments, the common sealant material segment operatively associated with a single tab, wherein, in operation, the hook member
25 engages a single tab and the common sealant material segment is pulled off of the pair of compartments to release both drugs therein for generally concurrent release into the inhaler to thereby allow combination inhalation dry powder drug delivery in operative position in an inhaler.

30 57. An inhaler according to Claim 51, wherein the plurality of drug compartments is at least 60.

58. An inhaler according to Claim 51, wherein the plurality of drug compartments is at least 90.

59. An inhaler according to Claim 51, wherein the plurality of drug
5 compartments is between about 90 to about 120.

60. An inhaler according to Claim 52, wherein the dry powder package body has a generally circular perimeter when viewed from the top or bottom, and wherein the plurality of drug compartments comprise a first plurality of circumferentially
10 spaced apart drug compartments disposed about a substantially common first radius extending from a center of the package and a second plurality of circumferentially spaced apart drug compartments disposed about a second substantially common longer radius extending from the center, with pairs of drug compartments defined by one from the first radius and one from the second radius.

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61. An inhaler according to Claim 60, wherein each pair of drug compartments are operatively associated with a common single tab.

62. An inhaler according to Claim 61, wherein the tab is a loop member.
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63. An inhaler according to Claim 62, wherein the tab has a closed perimeter surrounding an aperture, and wherein, in operation, the hook member is configured to extend through the aperture and capture a lower portion of the tab.

25 64. An inhaler according to Claim 63, wherein the tab comprises an elastomeric material that has increased structural rigidity relative to that of the floor sealant material.

65. A method of operating an inhaler, comprising;
30 moving at least one drug compartment held on a dry powder package into a dispensing position above a dry powder entry window in an inhaler, the dry powder package having a plurality of sealed drug compartments, each having a meted amount

of dry powder held captured therein above a releaseably attached floor sealant material;

engaging a tab extending generally downwardly from a portion of the floor sealant material;

5 pulling the tab to concurrently pull the floor sealant material off of at least one drug compartment;

releasing dry powder from the at least one drug compartment into a target inhalation flow path; and

vibrating the dry powder in the flow path.

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66. A method according to Claim 65, wherein the engaging step comprises extending a hook member into a generally downwardly extending loop portion of a respective tab and pulling the associated floor sealant material in a generally forward direction toward a user.

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67. A method according to Claim 65, wherein the moving step comprises moving a plurality of target drug compartments into the dispensing position, and wherein the engaging step engages a single tab and removes floor sealant material from the plurality of drug compartments to allow *in situ* mixing of different dry powder drugs for drug combination delivery.

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68. A method according to Claim 65, further comprising rotating a cover member attached to the inhaler to concurrently expose a mouth port and an air inlet port disposed upstream thereof, the mouth port and the air inlet port being disposed in generally diametrically from each other proximate outermost edge portions of the inhaler.

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69. A method according to Claim 68, wherein the tabs include a loop with an aperture that extends generally downwardly and is held proximate an outermost perimeter portion of the dry powder package, and wherein the engaging step comprises generally horizontally translating a hook so that a portion thereof enters the

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aperture and captures a portion of the loop to thereby pull the floor sealant material off the associated at least one drug compartment.

5 70. A method according to Claim 65, wherein the window is disposed proximate an outermost portion of the inhaler proximate the air inlet path, and wherein the target flow path extends across an elongate flow channel that has a length that is generally coextensive as a length of the inhaler.

10 71. A method according to Claim 65, further comprising displaying to a user a number associated with doses available for inhalation.

 72. A method according to Claim 71, further comprising automatically decrementing the number proximate in time to inhalation.

15 73. A method according to Claim 65, wherein the vibrating step comprises flexing a piezoelectric polymer film disposed in the inhalation flow path to vibrate the dry powder.

20 74. A method according to Claim 65, further comprising extending and retracting a mouthpiece on the inhaler to initiate and/or carry out the engaging step.